

Abstract

[0094] A tunnel junction structure comprises an n-type tunnel junction layer of a first semiconductor material, a p-type tunnel junction layer of a second semiconductor material and a tunnel junction between the tunnel junction layers. The first semiconductor material includes gallium (Ga), nitrogen (N), arsenic (As) and is doped with a Group VI dopant. The probability of tunneling is significantly increased, and the voltage drop across the tunnel junction is consequently decreased, by forming the tunnel junction structure of materials having a reduced difference between the valence band energy of the material of the p-type tunnel junction layer and the conduction band energy of the n-type tunnel junction layer. Doping the first semiconductor material n-type with a Group VI dopant maximizes the doping concentration in the first semiconductor material, thus further improving the probability of tunneling.